Is There Investment Value in the Soft-Dollar Arrangement? Evidence from Mutual Funds*

Sinan Gokkaya, *Ohio University*
Xi Liu, *Miami University*
Veronika Krepely Pool, *Vanderbilt University*
Fei Xie, *University of Delaware and ECGI*
Jinfan Zhang, *Chinese University of Hong Kong, Shenzhen*

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Abstract

Combining novel data on sell-side analysts' employment history and mutual fund commission payments, we provide the first evidence that mutual funds obtain investment value from sell-side research. Mutual funds generate higher abnormal holding and trading returns on stocks for which they have access to research by industry experienced analysts from their brokers. The outperformance is greater when funds are more important clients of their brokers, and cannot be attributed to tipping on upcoming analyst reports. Client funds place modestly higher weights on stocks for which they have access to analyst industry expertise from their brokers. We also find that funds allocate more commissions to brokers that provide industry expert analyst coverage on a greater proportion of the funds' holdings. For identification, we exploit disruptions to analyst coverage emanating from analyst turnovers, retirements, deaths, and brokerage house mergers. Our findings contribute to the intense debate concerning the unbundling of commissions under MiFID II in Europe and its implications for the U.S.

Keywords: Soft-dollar arrangements, broker commissions, mutual funds, sell-side research, industry knowledge, analyst coverage terminations

JEL classifications: G11, G14, G17, G20

* Email addresses: gokkaya@ohio.edu, liux60@miamioh.edu, vkpool@indiana.edu, xief@udel.edu, and jzhang2@imf.org. We greatly appreciate the very detailed and helpful comments from Jiekun Huang, Jennifer Juergens, Dong Lou, Tong Yao, and seminar participants at Cornell University, the Federal Reserve Board, Indiana University, the Securities and Exchange Commission, Texas A&M University, Tsinghua University, the University of Delaware, 2017 China International Conference in Finance (CICF) and 2018 Financial Economics and Accounting (FEA) Conference.

1. Introduction

On January 3, 2018, the landmark Markets in Financial Instruments Directive II (MiFID II) went into effect across the European Union.[1] Given the increasing degree of globalization of financial markets and institutions, the regulation's impact is also likely to find its way to the rest of the world. A major provision of the regulation is that fund companies are required to explicitly disclose and justify their payment for investment research. This requirement unbundles the fees that fund managers pay to brokerage firms for investment research and trade execution, essentially dismantling the long-standing soft-dollar arrangement.[2,3] As buy-side institutions and brokerage firms try to determine the pricing schedule for research services and the regulation's overall impact reverberates in the sell-side research industry, two important issues rise to the forefront of the discussion: Does sell-side research have investment value for institutional clients, and if so, which analysts provide more value to their client funds and therefore warrant premium payments?[4]

Despite a steady increase in the share of brokerage commissions used to pay for research services,[5] little is known about the investment value of research that brokerage firms provide to their institutional clients. To date, the only sources of sell-side value investigated by the extant literature are favorable IPO allocations and early information leaks about upcoming stock recommendations ("tipping"), of which the latter is a highly unethical, if not illegal, practice.[6] These activities also do not require sell-side skill or expertise. Additionally, anecdotal evidence suggests that only 2 to 5 percent of analyst reports

[1] The major objective of the sweeping regulation is to improve the transparency, fairness, and efficiency of capital market transactions.

[2] In soft-dollar arrangements, 50%-60% of transaction fees are rebated to fund managers routing the order to a broker's trading desk in the form of soft-dollars to acquire sell-side research. Our conversations with practitioners in the sell-side industry suggest that they anticipate major changes brought forward by the new regulation. Particularly, asset managers are required to establish a separate research payment account (RPA) to handle payments for sell-side research. For example, a senior executive at a U.S. based brokerage firm with more than 20 years of experience in the sell-side industry opined that "People in the industry are more concerned about MiFID II than anything in my career".

[3] Maggio, Egan, and Franzoni (2019) investigate institutional investors' trade allocation across brokerage houses and find that buy-side institutions are willing to pay up to 50% higher commissions to obtain access to sell-side research.

[4] In addition to compliance with MiFID II's disclosure requirement, the investment value of sell-side research is of interest to fund companies because many of them plan to absorb the research expense themselves rather than passing it onto fund investors.

[5] A 2011 survey conducted by Greenwich Associates among 217 institutions suggests that buy-side investors increased the share of equity brokerage commissions paid for research services from 53% in 2010 to 59% in 2011, which is a 10-year high.

[6] Existing studies that examine tipping provide mixed evidence: Irvine, Lipson, and Puckett (2007) and Xie (2014) document institutional clients trade before the public release of analyst recommendations, while Juergens and Lindsey (2009) and Busse, Green, and Jegadeesh (2012) find no evidence of such activity preceding recommendation upgrades. Relatedly, Reuter (2006) shows that funds receive preferential IPO allocations from their affiliated brokers. In a recent paper, Birru, Gokkaya, Liu, and Stulz (2019) study short-term trade ideas of sell-side analysts and document that institutional investors trade on this research product.

disseminated by brokerage firms are ever read by their clients, which casts further doubt on the investment value of sell-side research.[7]

In this paper, we provide the first evidence that mutual funds generate valuable investment ideas through sell-side analysts. Assessing the value of research obtained from brokerage houses is challenging because the actual mutual fund trades triggered by such research are not disclosed. More generally, the sources of information that motivates funds' individual investment decisions are not observable. To overcome this challenge, we propose an identification strategy to isolate fund transactions that ex ante are likely to be motivated by broker-supplied research. In particular, we hypothesize that portfolio stocks covered by industry expert analysts employed by the fund's brokers are likely to fit this description.

Our strategy relies on survey evidence that highlights the value of sell-side analysts' industry knowledge for institutional investors. For example, to gauge sell-side analysts' research services and skills deemed most important by their primary customers, the *Institutional Investor* (*II*) magazine polls buy-side institutions each year and lists the attributes that make a top analyst. Industry knowledge has consistently been ranked as the most important attribute. Corroborating the *II* magazine's annual polls, Groysberg and Healy (2013) and Brown et al. (2016) likewise find that executives, portfolio managers, and analysts at buy-side institutions repeatedly indicate that they rely on the industry knowledge of sell-side analysts while making investment decisions.

Consistent with the industry surveys, analysts with deeper industry insights can help client funds better understand the operational complexities of portfolio firms, including product lines, procurement channels, marketing, sales, distributional networks, and major customers and suppliers. They can also provide their clients with more in-depth analyses of the macroeconomic trends and industry dynamics and develop more refined stock valuation models, which can inform on client funds' ranking and selection of stocks within each industry (Boni and Womack, 2006; Groysberg and Healy, 2013). In addition, analysts with industry expertise can be crucial intermediaries providing mutual funds with direct access to portfolio firms.[8] By focusing on the industry knowledge of analysts employed by the funds' brokers, we isolate a subset of the funds' portfolio in which the influence of sell-side research should be most pronounced.

We exploit two novel datasets to examine whether analysts' industry knowledge generates investment value for their institutional clients. The first dataset contains biographical information on

[7] https://www.institutionalinvestor.com/article/b17jgmg3dls3mz/after-years-of-talk,-mifid-ii-is-live-here%E2%80%99s-how-it%E2%80%99s-already-changing-the-research-business.

[8] http://www.wsj.com/articles/newwallstreetconflictanalystssaybuytowinspecialaccessfortheirclients1484840659.

analysts' prior employment history, which we use to capture their related industry experience (Bradley, Gokkaya, and Liu, 2017).[9] The second dataset is based on semi-annual N-SAR filings, which contain broker commission payments for an extensive sample of diversified, actively managed equity mutual funds in the merged Thomson Financial and CRSP Mutual Fund database.[10] We use this information to identify broker-client relationships between brokerage firms and mutual funds. Our final sample contains 4,544 mutual funds and 2,161 analysts from 161 brokerage houses during the period 1999 to 2010.

We begin our analysis by examining whether client mutual funds obtain valuable investment ideas from industry expert analysts through soft-dollar arrangements. We employ a *within*-fund calendar-time portfolio methodology and compare the abnormal performance of stocks with industry expert analyst coverage from the fund's brokers to that of stocks lacking such coverage for the same fund over the same time period. This within-fund-portfolio approach allows us to effectively remove the effects of time-variant and time-invariant fund, fund manager, and fund family characteristics that may be related to investment performance.

We find that mutual funds generate Daniel, Grinblatt, Titman and Wermers (1997) (DGTW) characteristic adjusted monthly returns of 21 basis points on a value-weighted portfolio of stocks covered by industry expert analysts, which compounds to an economically significant 2.52% over 12 months. This stands in contrast with monthly abnormal returns of 4 (or -7) basis points on stocks that are covered by only non-industry-expert analysts (or no analysts) from the fund's brokers. The differences in the abnormal returns on stocks covered by industry expert analysts and other analysts is statistically significant, supporting the notion that mutual funds can generate higher abnormal returns on their investments through industry knowledge obtained from sell-side analysts with soft-dollars.

Moreover, underscoring the importance of access to premium analyst client services through the soft-dollar arrangement, we find that funds generate superior performance on stocks covered by industry expert analysts only when they are clients of the brokers employing these analysts. Interestingly, we also find that even among institutional clients of the same broker, those paying more commissions, i.e. VIP

[9] Related industry work experience is defined at the analyst-firm level by using the 4-digit Global Industry Classification Standards (GICS). As indicated by Boni and Womack (2006), GICS industry system matches well with analyst coverage industries. Validating the importance of industry knowledge extrapolated from pre-analyst industry work experience, Bradley, Gokkaya and Liu (2017) show that analysts with related industry experience generate higher quality research and are associated with more favorable career outcomes.

[10] Other studies using N-SAR filings include Edelen (1999), Reuters (2006), and Christoffersen, Evans, and Musto (2013). N-SAR filings report broker commissions at the registered investment company level. Therefore, we follow prior work and employ a proration algorithm to allocate trading commissions down to the fund level by assuming an equal allocation across brokerage houses (e.g. Edelen, Evans and Kadlec, 2012). To further validate the findings from N-SAR data, we also conduct analysis using institutional transaction data obtained from Ancerno Ltd., a proprietary institutional transaction database that measures broker commissions at the fund-broker level. Section 3.5 discusses these results in detail.

clients, generate more pronounced abnormal returns on their investments in stocks receiving industry expert analyst coverage, presumably because they have better access to analyst research services compared to non-VIP clients.

In additional analysis, we examine whether the investment value of analyst industry expertise varies across analysts and stocks. We find that industry expert analysts who have longer industry work experience, who are included in the All-American Research Team (i.e., All-stars), and who make better earnings forecasts and stock recommendations confer greater benefits to client funds' holding performance. The investment value generated by access to analyst industry expertise is more pronounced on fund holdings that move more in synch with their corresponding industries. Finally, while industry expert analysts with connections to covered firms' executives help funds earn higher abnormal returns on these stocks, those without such connections continue to add investment value to client funds.

We then buttress the holdings-based performance results by investigating the abnormal profitability of trades within each client fund's portfolio (Chen, Jegadeesh and Wermers, 2000; Kothari and Warner, 2001). We find that buy (sell) trades executed by client mutual funds on stocks covered by industry expert analysts generate significantly positive (negative) monthly abnormal returns. A long-short portfolio constructed using these buy and sell trades generates significant monthly abnormal returns of 28 bps. These returns are also higher than the monthly abnormal returns of similar long-short portfolios constructed on stocks with only other types of analyst coverage. The trades-based results continue to hold when we use transactional-level trade information from *Ancerno Ltd.*

To further help establish causality, we next examine a dynamic setting that utilizes shocks to a fund's access to sell-side research created by analyst departures. Using a difference-in-differences (DiD) approach, we exploit time-series variations in fund-stock-analyst pairs and find that client funds experience declines in trading performance on stocks losing analyst coverage from fund brokers, compared to other stocks in the same funds' portfolio. More importantly, as we differentiate between different types of analysts, we find that the marginal impact of industry expert analyst departures on the client funds' performance is more pronounced than that of other analyst departures. In a potentially more exogenous experiment, our DiD framework focuses only on terminations of coverage due to broker mergers, analyst retirements and deaths. We find economically and statistically similar results.

A general concern about any relation between analyst coverage and client fund performance is that is that the investment value from analysts is mainly derived from the "tipping" behavior on upcoming research reports, a controversial practice widely investigated in the literature (e.g., Irvine, Lipson, and Puckett, 2007; Xie, 2014). While tipping does not require analyst skill or expertise and

therefore cannot explain our results on the importance of analyst industry expertise, we provide additional analyses using the *Ancerno Ltd.* to directly address this concern. In particular, we show that our results are not affected when we exclude institutional transactions taking place beginning 5 days prior to the public release of analyst recommendation initiations, upgrade/downgrades, and revisions (i.e., trades potentially motivated by analyst tipping). This evidence lends further credence to the view that sell-side research provided by industry experienced analysts has investment value for institutional clients.

The superior investment returns on fund holdings covered by industry expert analysts from fund brokers raise two natural follow-up questions: First, does access to industry expert analysts affect mutual funds' portfolio choices? Second, do mutual funds allocate more commissions to brokers that provide more industry expert analyst coverage on the funds' portfolio holdings?

To answer the first question, we compare funds' portfolio weights on stocks with access to industry expert analysts to those without such access. Our results show that mutual funds exhibit a modest bias in favor of stocks on which they have such access. To establish a more direct link, we employ the aforementioned DiD approach based on coverage terminations due to analyst departures. Our results continue to hold. With respect to why we do not observe mutual funds investing only in stocks on which they have access to industry expert analysts, we follow Cohen, Frazzini, and Malloy (2008) and compare the average Sharpe ratios of fund holdings comprised only of stocks with industry expert analyst coverage to that of overall holdings. We find that portfolios consisting only of stocks where funds have access to industry expert analysts is associated with significantly lower Sharpe ratios, suggesting that it may not be optimal to invest more in these stocks because doing so may lead to a less diversified stock portfolio.

On the second question, we show that mutual funds reward brokerage houses providing more industry expert analyst coverage with significantly higher trading commissions. Economically, a one-standard-deviation increase in the percentage of a fund's portfolio stocks covered by industry expert analysts is associated with 0.10% (approximately 12% of the unconditional mean) higher relative broker share of trading commissions from the fund in the following year. The economic impact of industry expert analyst coverage on broker commission market share is at least as large as any other analyst characteristics. For comparison, a one-standard-deviation increase in coverage by all-star analysts is associated with 0.07% higher equity commissions. Our results are robust to the identification strategies used in the investment performance analyses.

To our best knowledge, we provide the first evidence that access to sell-side research through the soft-dollar arrangement helps improve mutual funds' investment performance. In the absence of data that link mutual fund trades to investment ideas obtained from analysts, determining whether fund

investors benefit from analyst research is challenging. Our identification strategy is built on insights from practitioner surveys on the importance of analyst industry knowledge, and allows us to zero in on mutual fund transactions that are, ex ante, most likely to be triggered by analyst research from the fund's brokers. Specifically, we show that mutual funds generate higher abnormal holding and trading returns on stocks for which they have access to research by industry expert analysts from their brokers. The superior performance is even more pronounced for funds that are more important clients of brokers providing such research. Importantly, our results are not driven by controversial practices such as early information leakage about upcoming analyst recommendations, the primary focus of related research to date (Irvine, Lipson, and Puckett, 2007; Xie, 2014). By demonstrating analyst industry knowledge as a major piece of the information mosaic that funds use to make portfolio allocation decisions, we also contribute to the recent debate on whether sell-side analysts research on firms is largely "information-free" (Altinkilic and Hansen, 2009; Loh and Stulz, 2011; Altinkilic, Hansen, and Ye, 2016; Li and You, 2015; Kim and Song, 2015).

Our results also speak to the long-standing debate on if and how mutual funds should pay for the investment research (Chordia and Brennan, 1993). Soft-dollar payments, which represent the traditional business model, have come under considerable scrutiny over the years. The newly enacted MiFID II effectively eliminates these indirect payments and the practice of bundling research with commissions by requiring mutual funds to provide direct payments for the investment research they receive. This, in turn, has generated an intense debate both in Europe and in the U.S. While comparing the optimality of direct versus indirect payments is outside the scope of our paper, our findings suggest that investment ideas generated from analyst research have an economically significant effect on funds' portfolios and provide a basis for the pricing of sell-side research that is necessary for mutual funds to comply with MiFID II. Since our tests cannot capture all analysts driven trades, we likely underestimate the value of their research for institutional investors.

Nevertheless, our findings have the potential to help us understand some of the changes expected to take place as a result of MiFID II. For instance, we find that in contrast to industry expert analysts, access to other analysts is not consistently associated with abnormal fund performance. At a minimum, this suggests that at least some analysts' research does not appear to generate investment value for their clients. Therefore, it is not surprising that some funds plan to reduce their research budget following the implementation of MiFID II. Our finding on the investment value of analyst industry expertise is also consistent with the trend of brokerage firms to become more specialized and develop deep sector

expertise,[11] and the increased tendency among less experienced analysts to exit the sell-side research profession following MiFID II (Fang, Hope, Huang, and Moldovan, 2019).

Our study is the first in-depth analysis of the impact of analyst industry knowledge on client funds' investment performance, portfolio decisions and brokers' trading commission market shares. Although analyst industry knowledge has consistently been viewed as the skill most sought after by buy-side clients, the extant literature is silent on whether analyst industry knowledge actually affects any economic decision making in the relationship between buy-side institutions and brokerage houses. Our study provides evidence that industry expert analysts help their brokerage houses attract greater commission revenues from mutual funds. As such, it sheds light on the economics of the investment research industry and extends a growing academic literature on the determinants of order flow and trading commissions.[12]

Finally, prior research shows that fund investors benefit from information transfer from several economic agents, such as in-house research departments (Cheng, Liu and Qian, 2006; Groysberg et al., 2013), board members in portfolio firms (Cohen, Frazzini and Malloy, 2008), commercial lending units and loan market (Massa and Rehman, 2008; Ivashina and Sun, 2011), and prime brokers (Kumar, Mullally, Ray, and Tang, 2018). We add to this literature by identifying industry expert analysts as another source of information contributing to mutual fund investment performance. Relatedly, by demonstrating that mutual funds can improve their investment decisions by gaining access to industry expert analysts through broker commission allocation, we extend the body of research on cross-sectional characteristics related to fund performance.[13]

The remainder of the paper is organized as follows. Section 2 presents the data and descriptive statistics. Section 3 investigates whether client mutual funds obtain valuable investment ideas from the sell-side analysts through holdings- and trades-based fund performance. Section 4 examines the impact of industry expert analysts on the weights assigned to portfolio stocks by mutual funds, while Section 5 assesses the association between mutual funds commission allocations and industry expert analyst coverage on the funds' portfolio holdings. Section 6 concludes.

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[11] https://www.bloomberg.com/professional/blog/decoding-effect-mifid-iis-research-rules.

[12] Prior studies have identified the following determinants: analyst reputation, optimism, boldness and forecast frequency (e.g. Ljungqvist, Marston, and Wilhelm, 2006; Jackson, 2005; Juergens and Lindsey, 2009), broker size (Irvine, 2001; Juergens and Lindsey, 2009), affiliated investment banking units (Ellis, Michaely and O'Hara, 2002; Choi, Clarke, Ferris and Jayaraman, 2009), historical broker commission shares (Conrad et al., 2001; Goldstein et al., 2009), hosting investor conferences (Green et al., 2014), and All-star analysts (Maggio, Egan and Franzoni, 2019).

[13] Please see Wermers (2011) for an excellent review of related literature.

2. Data and Descriptive Statistics

The dataset employed in this study is constructed from a variety of sources. First, we obtain broker trading commission allocation data from semi-annual N-SAR filings for an exhaustive sample of domestic equity mutual funds during the period of 1999 to 2010. Within each N-SAR filing, registered investment companies are required to provide information on the names of 10 brokerage firms to which they paid the most trading commissions during the reporting period, along with the amount paid to each corresponding broker. Broker commissions are reported at the series level in N-SAR filings. A series represents a subset of funds of a given family. Therefore, families typically file several N-SAR forms for the same time period: one for each series. We use a proration algorithm to allocate broker commissions paid at the series level down to the fund level by assuming an equal allocation across funds to each brokerage house mentioned in the filing (Edelen, Evans and Kadlec, 2012).

We start by manually matching the names of mutual funds in the N-SAR filings to those in the CRSP Mutual Fund Database. We then merge the CRSP Mutual Fund Database with the Thomson Financial's CDA/Spectrum Mutual Fund Holdings Database using MFLinks in order to obtain information on fund holdings. We apply several filters to this merged mutual fund sample. First, we exclude bond, balanced, international, index, and sector funds from our sample. We require that the funds report assets under management and have at least one year of reported returns (Chen et al., 2004). To eliminate incubation bias, we further remove funds with missing names, those with fewer than 10 stocks in their portfolios, and funds for which the year of observations is before the fund's starting year. Finally, we include funds with multiple share classes only once.

For firms held by funds in our mutual fund sample, we obtain stock returns and financial characteristics from CRSP/COMPUSTAT, and use the Institutional Broker Estimate System (*I/B/E/S*) database to identify sell-side analysts providing research coverage. The initial sample of analysts is then merged with I/*B*/*E*/*S* recommendation files to retrieve each analyst's last name, first name initials, and brokerage house information. Analysts sharing the same last name and first name initial and working at the same broker are excluded from the sample. Analyst teams are likewise eliminated since I/*B*/*E*/*S* furnishes only the last names of analysts assigned to a team. This initial screening criterion yields 7,911 analysts from 1999 to 2010. For each of these analysts, we then search *Zoominfo.com,* an employment indexing website, to obtain her entire first name. This step returns 4,725 analysts. Finally, we search *LinkedIn.com,* the world's largest professional network, to gather pre-analyst industry employment history using the analyst's first and last name along with the corresponding brokerage house. We are able to locate the profiles of 2,577 unique analysts on *LinkedIn*, and they are employed by 344 unique brokers.

For each of these analysts, we collect detailed information on the names of former employers as well as years of employment at each company irrespective of its public/private status. Analyst industry experience is then classified as "related" and "unrelated" at each coverage firm level. Specifically, a sell-side analyst is defined as having "related experience" in a firm if one of the analyst's prior employers and the firm share 4-digit Global Industry Classification System (GICS) classification code (Boni and Womack, 2006). Otherwise, pre-analyst work experience is defined as "unrelated". Analysts without pre-analyst industry work experience are defined as "inexperienced". For expositional convenience, we refer to analysts with related industry work experience in the stocks they cover as "industry expert analysts".

****Table 1 here****

Table 1 provides descriptive statistics for the overall sample as well as the annual breakdown. . We report the number of unique funds and number of unique stocks in the investment portfolios of mutual funds. Our sample contains a total of 4,544 funds investing in 13,634 unique firms. About 32% of stockholding firms have sell-side analyst coverage irrespective of trading commission commitments. Decomposing pre-analyst industry work experience based on its relevance to stockholding firms' industries, we find that about 8% (30%) of firms are followed by at least one analyst possessing related (unrelated) industry work experience. The table also shows that the percentage of mutual fund holdings receiving analyst coverage rises over time, from the 25%-30% range in early part of the sample to about 40% in later years of the sample. This is likely due to the increasing popularity of *LinkedIn.com* among investment professionals including sell-side analysts. While there is no reason to believe this would systematically bias results, we nevertheless conduct within mutual-fund portfolio analysis and include year fixed effects to control for the potential impact of this time trend on our analyses. With respect to the main characteristics of the funds in our sample (untabulated), the average fund has total net assets (TNA) of $392.99 million, a turnover ratio of 94.55% per year, an expense ratio of about 1.3% as a fraction of year-end TNA, and an age of 8.25 years.

3. Mutual Fund Performance and Industry Knowledge of Sell-Side Analysts

In this section we ask whether client mutual funds obtain valuable investment ideas from the sell-side analysts. Our main challenge is that the sources of information that motivate individual investment decisions are not directly observable. As indicated earlier, to overcome this challenge, we focus on funds' investments in stocks covered by industry expert analysts employed by their brokers, because these portfolio choices are, ex ante, more likely to be motivated by broker-supplied research.

To measure the impact of sell-side research on the investment performance of client funds, we use a standard calendar-time portfolio methodology and compare the holdings- and trades-based performance of stocks in a client fund's portfolio that receive expert analyst coverage from the fund's brokers to that of stocks in the *same* funds' portfolio that do not receive such coverage. This *within-fund* comparison of stocks allows us to effectively remove time-variant and time-invariant fund, fund manager, and fund family characteristics that may be related to the investment performance of portfolio holding stocks.

3.1. Holdings-based performance of mutual funds

We begin our analyses by evaluating holdings-based performance. In our baseline model, we use Daniel, Grinblatt, Titman and Wermers (DGTW, 1997)'s characteristic adjusted returns to measure the abnormal holdings performance of stocks in a mutual fund's portfolio.[14] Specifically, at the beginning of each quarter, we classify each fund's stock holdings according to research coverage by analysts from brokers receiving trading commissions from the fund. We first construct two main portfolios for each fund: a "coverage portfolio" that consists of stocks covered by analysts from the fund's brokers (affiliated analysts), and a "no-coverage portfolio" that consists of stocks without analyst coverage from the fund's brokers. Within the coverage portfolio, we further differentiate based on whether a stock is covered by industry expert analysts from the fund's brokers. Once a stock is assigned to one of the portfolios, we hold that stock in the portfolio for the entire duration of the quarter and rebalance these portfolios at the end of each quarter in accordance with updated information on analyst coverage and fund holdings.

To compare the performance of the holdings that are covered by industry expert analysts at the fund's broker to those of other holdings, we calculate monthly value-weighted average portfolio returns for each portfolio formed by type of coverage in each fund-quarter using the dollar value of the holdings as weights. For portfolios with the same type of analyst coverage, we then calculate the weighted average of these portfolio returns across funds in each quarter, using each fund's TNA as the weight.

****Table 2 here****

Panel A of Table 2 reports the within-fund portfolio holdings results. In columns 1-3 we report the performance of the no-coverage portfolio and coverage portfolio as well as the difference between them. The results illustrate that the portfolio of stocks with no coverage underperform the coverage

[14] For robustness, we re-estimate the calendar-time portfolio returns using Fama and French's (1993) three-factor model, Carhart's (1997) four-factor factor, Pastor and Stambaugh's (2003) five-factor model, and Ferson and Schadt's (1996) conditional model, and find similar results.

portfolio. The raw and abnormal return differences between these portfolios are statistically significant (19 and 11 basis points, respectively).

More importantly, we further partition each fund's coverage portfolio based on whether a stock is covered by an industry expert analyst from fund brokers. We find that the value-weighted portfolio comprised only of stocks covered by industry expert analysts from fund brokers earns significant raw and abnormal returns (column 4). For instance, the corresponding portfolio's DGTW monthly alpha is 21 basis points, which compounds to an economically significant 2.54% over 12 months. In contrast, the DGTW monthly alpha generated by the portfolio of stocks covered only by other analysts is much smaller in economic magnitude (3 basis points) and statistically insignificant (column 6). In addition, columns 5 and 8 show that the abnormal returns of fund holdings covered by industry expert analysts from fund brokers significantly exceed those of other stocks (either those without analyst coverage or those covered by other analysts). These results suggest that access to analyst industry expertise helps mutual funds make better investment decisions and deliver higher abnormal returns on their portfolio holdings.

An alternative explanation for the performance differences in Panel A of Table 2 is that industry expert analysts in general may have a superior ability to identify higher performing stocks, and therefore, a fund's holdings covered by industry expert analysts tend to outperform the funds' other holdings, regardless of whether the industry expert analysts are from the fund's brokers. To rule out this possibility and also directly isolate the value of premium analyst research services mutual fund clients obtain through soft dollars, we construct another portfolio that consists of a fund's holdings covered by industry expert analysts who are not employed by the fund's brokers (industry expert analysts from other brokers). This portfolio has a DGTW monthly alpha of 4 bps (column 2 of Table 2, Panel B). This is much lower than the monthly alpha of the portfolio of fund holdings covered by industry expert analysts from fund brokers (column 1 of Panel B), and the difference of 17 bps is statistically significant (column 3 of Panel B). Therefore, these results highlight the value of premium research services provided by industry expert analysts for mutual funds' performance and the importance of funds' access to such services secured through the soft-dollar arrangement (Valentine, 2011; Groysberg and Healy, 2013).[15]

Related to the point above, we further explore whether a broker provides all of its clients the same level of access to its analyst research services. We hypothesize that more important clients have more access to the broker's premium research services. To test this conjecture, we classify a fund as a

[15] As an additional way to address this concern, we compare the abnormal performance of stocks covered by industry expert analysts to stocks covered by other analysts irrespective of stockholdings by mutual funds. We do not find any significant difference.

broker's VIP client if its commission payment to the broker is above the median among all the broker's clients in a given year. Using this classification, we partition the portfolio of fund holdings covered by industry expert analysts from fund brokers into two sub-portfolios based on whether the industry expert analysts are from brokers where a fund is a VIP client or not. Columns 4 and 5 in Panel B report the raw and abnormal monthly returns of these sub-portfolios. We find that both sub-portfolios generate significantly positive monthly alphas, but importantly, the abnormal monthly alpha is significantly higher by 20 bps for the sub-portfolio of fund holdings covered by industry expert analysts from brokers where the funds are VIP clients (column 6). This evidence is consistent with our hypothesis and underscores the value of greater access to analyst research services for mutual funds.

3.2. Cross-sectional variations in the investment value of analyst industry expertise

In this section we explore cross-sectional variations in the performance benefits that mutual funds receive from access to industry expert analysts. This analysis can shed light on the mechanisms through which analyst industry knowledge factors into fund performance and the situations where acquisition of superior industry insights can provide fund managers with a greater advantage in generating abnormal performance.

****Table 3 here****

First, we differentiate among industry expert analysts based on the quality of their industry knowledge, which we use four proxies to capture. In Panel A, we use the length of the analyst's related industry work experience and whether the analyst is named an "All Star" in a given year by the *II* magazine. In Panel B, we distinguish between industry expert analysts based on the relative accuracy of their earnings forecasts and abnormal returns generated by their stock recommendation on their coverage stocks. Our conjecture is that industry expert analysts who have longer pre-analyst related industry work experience, who are "All Stars", and who make superior earnings forecasts and stock recommendations may have a better understanding of their industries and can provide deeper industry insights to aid in their institutional clients' investment decisions. To test this hypothesis, we partition industry expert analyst based on (1) whether the length of their industry work experience is above the sample median, (2) whether they are "All Stars", (3) whether their average relative earnings forecast accuracy is above the sample median, and (4) whether the average magnitude of abnormal DGTW returns to their buy/sell recommendations is above the sample median . We evaluate the return performance of portfolios of fund holdings covered by each subset of industry expert analysts from fund brokers, and present the results in Panels A and B of Table 3. We find that each portfolio is associated with significantly positive raw returns

and abnormal returns (columns 1, 2, 4, and 5 of Panels A and B). More importantly, consistent with our conjecture, the returns are more significant, both economically and statistically, for portfolios of stocks on which funds have access to industry expert analysts with higher quality industry knowledge (columns 3 and 6 of Panels A and B).

Next, we investigate whether industry expert analysts' research transforms into greater competitive advantages for portfolio holding firms whose operations move more in synch with their corresponding industry fundamentals. The idea is that the experience and knowledge obtained by analysts from working for some firm(s) in the industry are more applicable to peer firms in more homogeneous industries where firms share more commonality in their fundamentals. To examine this possibility, we partition fund holdings covered by affiliated industry expert analysts based on whether a stock's earnings per share (EPS Synch) and stock return (Ret Synch) synchronicities and the correlation of its stock returns with industry returns (Ret Corr) are above or below the respective sample medians (Merkley, Michaely, and Pacelli, 2017; Parrino, 1997). Consistent with our conjecture, Panel C of Table 3 shows that while the monthly alphas are significantly positive for all sub-portfolios, they are significantly higher for those consisting of stocks with above-median earnings and stock return industry synchronicity (columns 1-3 and 4-6 respectively) as well as return correlations (columns 7-9).

In addition to deeper industry understanding and insights, prior industry work experience may enable industry expert analysts to provide mutual funds with superior access to portfolio firms' management. While corporate access and industry knowledge are not mutually exclusive channels through which industry expert analysts can add investment value to their mutual fund clients, a potential concern with our results so far is that they may be entirely driven by corporate access rather than industry knowledge. Therefore, we next investigate the marginal impact of corporate access on the value of these analysts' research for client funds. In particular, we consider several measures to capture analysts' ability to provide corporate access to mutual fund clients. Our first measure is an indicator that takes the value of one if an analyst shares a professional connection with the coverage firm's management defined based on overlapping employment between industry experienced analysts and executives at coverage firms (Bradley, Gokkaya and Liu, 2019). Our second measure is an indicator that takes the value of one if an analyst is able to ask the first question during an earnings conference call. Our last measure of access to management is an indicator for whether an analyst publishes a takeaway report in *Thomson Reuters Investext* about her one-on-one meeting with firm management. We partition the portfolio of fund holdings covered by industry expert analysts based on analysts' access to a firm's management. Results in Panel D of Table 3 show that funds earn significantly higher monthly abnormal returns on stocks covered by

industry expert analysts who have better access to the management of the firms. However, it is worth noting that even when industry expert analysts do not appear to have greater access to firm management, they can still contribute to better fund investment performance on stocks they cover. Overall, the evidence suggests that the investment value of industry expert analysts to mutual funds arise from both their industry expertise and access to firm management.[16]

3.3. Trading-based performance of mutual funds

Our results thus far show that mutual funds significantly outperform on those stocks in their portfolios that are covered by industry expert analysts from their brokers. This is consistent with the argument that they receive valuable investment ideas from the sell-side through soft-dollar arrangements. In this section, we provide further robustness by analyzing the performance of trades within each fund's portfolio. To the extent that mutual fund managers also capitalize on time-varying investment opportunities in the stock market using research from industry expert analysts, trading-based analyses have the potential to better identify the impact of sell-side research on mutual fund performance.

Towards this end, we compare the abnormal performance of buy and sell trades by each fund. Specifically, for each holding quarter, we classify a stock as net buy (sell) if the change in the portfolio weight is positive (negative) from the beginning to the end of a quarter, where beginning quarter (lagged) portfolio weights are adjusted to price changes to avoid classifying mechanical weight changes driven by price fluctuations as trades (Kacperczyk, Sialm, and Zheng (2005)). Next, for each fund, we distinguish among stocks based on the type of analyst coverage they receive and separately place them into net buy and sell portfolios. We then compute the value-weighted returns of each portfolio using the dollar value of purchased or sold shares as the weight and report abnormal returns from a portfolio strategy that goes long on buys and short on sells. The portfolios are rebalanced at the end of each quarter according to the updated trade direction on each stock in each fund's portfolio.

****Table 4 here****

Panel A of Table 4 presents the results of our trading-based test. A long-short portfolio strategy (buys minus sells) comprised entirely of stocks covered by industry expert analysts from fund brokers earns an average DGTW abnormal monthly return of 28 basis points (column 1). Both the long and short

[16] We also examine the implications of potential analysts' bias for the value of their research to client funds. In particular, we consider analysts' affiliation with brokers that have underwriting relationships with coverage firms (Lin and McNichols, 1998; Michaely and Womack, 1999), their strategic or non-strategic optimism (Malmeinder and Shanthikumar, 2014), and their herding tendency due to career concerns (Hong Kubik, and Solomon, 2000). Untabulated results indicate that potential biases of industry expert analysts do not significantly affect their impact on the performance of fund holdings that they cover, suggesting that buy-side investors are able to de-bias the sell-side research received from brokers.

portions of the portfolio contribute to the abnormal returns, as the funds' buy (sell) trades earn a statistically significant DGTW monthly alpha of 19 (-9) basis points in stocks covered by industry expert analysts from fund brokers (untabulated). In contrast, the long-short portfolio constructed using fund trades on stocks with no analyst coverage or other analyst coverage from fund brokers generates much weaker abnormal returns (columns 2 and 3). The long-short portfolio of stocks covered by industry expert analysts from fund brokers outperforms the long-short portfolio of stocks with no analyst coverage from fund brokers by 22 basis points per month (column 4), and the long-run portfolio of stocks with other analyst coverage from fund brokers by 27 basis points per month (column 5). Both of these differences are statistically significant and economically meaningful. These results suggest that analysts' industry expertise can help mutual funds make more profitable buy and sell trades.

To further demonstrate the importance of access to premium research services through soft dollars, we conduct two additional tests similar to those in Panel B of Table 2. First, we compare the performance of long-short portfolios of buy and sell trades in stocks with industry expert analyst coverage from fund brokers versus stocks with only industry expert analyst coverage from other brokers. The portfolio comprised of trades in stocks with the former type of coverage earns an additional monthly alpha of 18 bps (column 6), suggesting that it is not industry expert analyst coverage per se but funds having access to premium research services provided by these analysts that drives our results. Second, among fund holdings with industry expert analyst coverage from fund brokers, we create further differentiation based on whether a fund is a VIP client of a broker. We find that when funds are VIP clients of brokers providing industry expert analyst coverage, the long-short portfolio constructed using their buy and sell trades in covered stocks outperforms by 34 bps per month, compared to when funds are non-VIP clients of these brokers (column 7). This evidence is consistent with brokers granting their top clients better access to analyst research services, which translates into more profitable fund investments.

3.4. Identification: Analyst Departures

A potential econometric concern with our analyses is that the extent and type of analyst coverage that a mutual fund's portfolio firms receive from a particular brokerage firm may not be random. This poses difficulties to a causal interpretation of the results from the portfolio analyses. For a sharper identification of the effect of analyst industry expertise, we examine a dynamic setting that exploits the time-series variation in fund-stock-analyst pairings due to analyst departures from brokerage houses. If a client fund loses industry expert analyst coverage on its portfolio firms and if research provided by these

analysts is indeed a source of information for the fund, we expect the fund's investment performance in the affected stocks to deteriorate. Note that any performance decline in affected stocks should mainly arise through the mistiming of trades: buy-and-hold positions should be unaffected by analyst departures. Therefore, to test our conjecture, we examine the performance of fund trades-based portfolios.

We identify 33,469 (4,145) cases where a mutual fund experiences a loss of analyst (industry expert analyst) coverage on its portfolio firms due to analysts leaving the fund's brokers. To eliminate common influences that affect similar stocks at the same time, we employ a difference-in-differences (DiD) approach. Specifically, we construct a long-short portfolio based on a fund's buy and sell trades on stocks losing analyst coverage (treatment stocks) as well as a long-short portfolio on the same fund's buy and sell trades on similar stocks without analyst coverage change (control stocks). We then compare the changes in the raw and DGTW returns of the long-short portfolios of treatment and control stocks from year t-1 to year t+1, with year t being the event year. In particular, we employ Daniel et al.'s (1997) algorithm and require that control stocks are in the same size, book-to-market, and momentum quintile as the treatment stocks during the month of June prior to the event and do not experience a change in analyst coverage in the pre- or post-event year.

Panel B of Table 4 presents the results. Focusing on the mean DiD for DGTW abnormal returns, we find that abnormal monthly performance of a long-short portfolio of stocks where client funds lose access to analyst research services is 22 basis points lower in the post-event year (t+1) compared to pre-event year (t-1), and the difference is statistically significant at better than 1% level (column 1). In columns 2 and 3, we distinguish among treatment firms based on departing analysts' industry experience, i.e., industry expert analysts vs. other analysts. Our results show that the long-short portfolio of treatment stocks losing industry expert analysts from fund brokers is associated with significantly lower monthly abnormal investment performance in the post-event period compared to the pre-event period (DiD=-95 bps). Likewise, for the long-short portfolio of stocks losing coverage by other analysts from fund brokers, the monthly abnormal performance also deteriorates by 17 bps from the pre-event to post-event year. More important for our purpose, as shown in column 4, the loss of expert analyst coverage leads to economically and statistically more pronounced declines in client funds' trading performance (Difference in DiD=-77 bps).

Panel C repeats the DiD methodology with a subsample of analyst departures that are arguably more exogenous, including those resulting from brokerage house mergers, analyst retirements unrelated to broker events (age 65 and over), and analyst deaths stemming from the 9/11 terrorist attacks (Kelly and Ljungqvist, 2012). Comparing the DiD in abnormal returns of the portfolio of trades in treatment

stocks losing industry expert analyst coverage with that of stocks losing only other types of analysts, we find results economically and statistically similar to those reported in Panel B.[17] Overall, the evidence presented in this section lends more credence to a causal interpretation that access to industry expert analysts can improve mutual funds' portfolio investment decisions.

3.5. Investment value of analyst industry expertise: Ancerno Ltd. and Tipping Behavior

Another plausible concern with our results is that the superior performance that mutual funds generate on stocks covered by industry expert analysts from fund brokers may simply come from early information leaks about upcoming stock recommendations ("tipping"). The practice of tipping has been the primary focus of academic work investigating the association between sell-side research and institutional clients. The evidence from the literature has been mixed (e.g., Irvine, Lipson, and Puckett, 2007, Goldstein, Irvine, Kandel, and Wiener, 2009, Juergens and Lindsey, 2009, Christophe, Ferri, and Hsieh, 2010, Busse, Green, and Jegadeesh, 2012, and Xie, 2014). While there is no reason to believe industry expert analysts are more likely to tip their institutional clients compared to other analysts and the investment value of expert analysts is mainly attributed to such behavior, we nevertheless provide additional analyses to directly address this issue.

To make sure that our results are not driven by early information leakage on upcoming analyst stock recommendations we exclude fund trades that may be prompted by analyst tips, that is, trades that are executed around analyst reports on the stock. Due to the low frequency of holdings disclosures, it is not feasible to apply this data restriction to the Thomson Holdings database. Therefore, in this section we use institutional transaction data obtained from Ancerno Ltd. (formerly Abel Noser), a consulting firm for institutional investors that tracks and evaluates transaction costs.[18] Hu, Jo, Wang and Xie (2018) documents that Ancerno data cover roughly 12% of CRSP trading volume over 1999-2011. Ancerno reports the dates, number of shares, broker commissions, broker name for each trade in the dataset, allowing for trade-performance analysis at the fund-stock-broker level. Ancerno contains a total of 166 brokers, 176 unique institutions, and 323 money managers during our sample period.

Our approach is as follows. First, we follow Puckett and Yan (2011) and calculate implied quarterly trades by aggregating all transactions for each institution-stock pair and each quarter. The

[17] As a robustness check, we also focus on the departures of analysts who have exhibited above-average capabilities. The rationale behind this test is that the departure of below-average analysts may actually be the result rather than the cause of buy-side investors being unsatisfied with the research service they received and taking their business elsewhere. Our result remains highly significant after we remove those analysts with below-median earnings forecast accuracy.

[18] Prior studies that use Ancerno data include, among others, Goldstein et al. (2009), Chemmanur, He, and Hu (2009), Puckett and Yan (2011), and Green et al. (2014).

resulting quarterly net trades capture the net change in quarterly holdings and are thus analogous to the trade metrics in our previous analyses. In Panel A of Table 5, we re-estimate the trade-based results reported in Panel A of Table 4 using the implied quarterly trades from Ancerno to confirm that the two data sources yield consistent results on the impact of industry expert analyst coverage on the abnormal profitability of trades executed by client funds. As reported in the panel, we continue to find that access to industry expert analysts leads to more profitable abnormal trading returns.

****Table 5 here****

Second, to exclude trades that may be prompted by tipping, we re-calculate our implied quarterly trades by first eliminating all trades in the Ancerno sample that are executed over the five days preceding the public release of analyst recommendations on a coverage stock. We then aggregate all remaining transactions for each institution-stock pair and each quarter as before. This approach insures that all potential transactions potentially driven by tipping are purged. Using the new quarterly net trade measures, we then repeat our trade-performance analyses. The results are reported in Panel B. The panel shows that the estimated coefficients are largely similar to those in Panel A and confirms that tipping does not drive our results in an economically meaningful way.

4. Analyst Industry Expertise and Mutual Fund Portfolio Allocation Decisions

In this section, we investigate the impact of industry expert analysts on the weights assigned to portfolio stocks by mutual funds. If access to industry expert analysts helps mutual funds generate higher abnormal performance, we would expect funds to allocate higher portfolio weights to stocks on which they have such access.[19] To test this prediction, we follow prior research (e.g., Cohen, Frazzini, and Malloy, 2008) and compute portfolio weights at the stock-fund-quarter level, which are the dependent variable of our analysis. Key independent variables are indicators for the types of analyst coverage that stocks receive from the fund's brokers. We control for the fund's style,[20] the stock's market capitalization, market-to-book ratio, and past-12-month momentum, analyst and broker characteristics, and fund and quarter fixed effects. We adjust standard errors for heteroskedasticity and fund-level clustering.

****Table 6 here****

[19] Client funds presumably can receive either positive or negative news on stocks covered by industry expert analysts. However, mutual funds are largely not allowed to take short positions in portfolio holding firms. Therefore, we may not observe fund positions on stocks on which they receive negative information.

[20] Fund style is computed as the percentage of a fund's total assets invested in the style of the portfolio holding stock in question, where style is defined as in DGTW (1997).

Panel A of Table 6 reports the regression results. As seen in model 1, client funds invest an incremental 1.8 basis points (2% of unconditional mean) in stocks for which they have access to research by sell-side analysts. Differentiating among analysts based on their pre-analyst industry experience, model 2 shows that the relation between industry expert analyst coverage and portfolio weights assigned to fund holdings is larger (2.1 basis points, t-stat=8.71) than that for analysts with unrelated industry work experience (0.62 basis point, t-stat=4.79) or inexperienced analysts (0.43 basis points, t-stat=3.08).

To establish a clearer causal link between analyst coverage and portfolio weight on stocks, Panel B of Table 6 uses the previously discussed DiD specifications and investigates the impact of analyst departures from brokers on the changes in portfolio weights assigned to treatment stocks by mutual funds. Examining the difference in DiD for stocks losing industry expert analysts to those losing other types of analysts, we find that the mutual funds reduce portfolio weights on the former group of stocks by a larger margin (columns 2-4). Panel C focuses on the subsample of coverage terminations related to potentially more exogenous broker and analyst events and finds similar results.

One plausible implication of the results from this section is that fund managers may simply invest more time and effort in obtaining information on stocks covered by industry expert analysts given the relatively higher portfolio weights assigned to such stocks. This, in turn, may explain the abnormal investment performance documented in Section 3. To examine this possibility, we follow Fich, Harford, and Tran (2015) and identify stocks in which a fund's dollar investment is above the median within the fund's portfolio. Even within this subset of fund holdings, which are expected to receive more attention and efforts from fund managers, we continue to find evidence of higher abnormal returns accrued to holdings and trades in stocks for which funds have access to industry expert analysts (untabulated).

A natural question arising from the results in this section is why mutual funds do not allocate an even greater fraction of their portfolios to stocks on which they have access to industry expert analysts, given the superior returns they earn on these stocks. To address this question, we conduct an empirical analysis similar to that in Coval and Moskowitz (2001) and Cohen, Frazzini, and Malloy (2008). Specifically, we compare the Sharpe ratio of a mutual fund's entire portfolio and of stocks with industry expert analyst coverage within the same fund's portfolio. We find a Sharpe ratio of 0.35 for the overall portfolio compared to 0.12 for the industry expert analyst coverage portfolio, with the Sharpe ratio difference being statistically significant. This suggests that it may not be optimal for client funds to increase the weights on stocks covered by industry expert analysts, presumably because doing so reduces the degree of portfolio diversification.

5. Buy-Side Commission Allocations and Industry Knowledge of Sell-Side Analysts

Having shown that mutual funds derive significant investment value from industry-expert analysts at their brokers, we now ask whether mutual funds value analysts' industry knowledge and reward brokers providing industry expert analyst coverage on their stockholding firms with a greater allocation of trading commissions.

5.1. Baseline regressions

In similar spirits to prior work (e.g., Green et al., 2014), we define a broker's relative commission share from a mutual fund as the total commissions allocated to broker *j* by mutual fund *i* during period *t* scaled by total commissions paid by mutual fund i to all brokers during the same time period (*%Broker shar*e). We estimate OLS regressions of a broker's relative commission share from a mutual fund on analyst coverage provided by the broker for the fund's stockholding firms. The primary variables of interest are the percentages of the fund's portfolio firms covered by various categories of analysts employed by the broker, including all sell-side analysts (*% Analyst Coverage*), analysts with related industry work experience*(% Related Experienced Analyst Coverage)*, analysts with unrelated industry work experience (*% Unrelated Experienced Analyst Coverage*), and analysts without any prior industry experience (*% Inexperienced Analyst Coverage*).

Next, we include a comprehensive set of controls that may also be important determinants for broker commission commitments. For instance, Conrad et al. (2001) and Goldstein et al. (2009) suggest that the most important determinant of broker commissions on any trade is the prior-period commission allocations. Large brokerage houses with greater resources may promote their research services to potential buy-side clients more effectively, resulting in a greater market share (Irvine, 2001; Choi et al., 2009). In addition, Ellis et al. (2002) argue that broker commitments may respond to affiliated investment banking business on portfolio holding stocks.[21] Therefore, we control for one-year lagged relative broker market share (*% Lag (Broker Share)*), broker size (*Top10 Broker*) and the percentage of portfolios stocks with investment bank affiliation to the broker (*%Affiliated Investment Bank*). A legitimate concern with our analysis is that analyst industry expertise may be correlated with the industry specialization of the brokers employing such analysts. Thus, we explicitly control for a binary indicator that equals one if a brokerage firm and a mutual fund share the same industry specialization (*Same Industry Expertise*). [22]

[21] Consistent with this notion, Jackson (2005) documents that acting as a lead manager for an initial public offering (IPO) or secondary equity offering (SEO) increases the affiliated broker's market share of trading commissions.

[22] We define a broker's industry specialization as the industry with the largest number of firms covered by the broker and a fund's industry specialization as the industry with the largest number of firms in the fund's portfolio.

It is also plausible that industry work experience of sell-side analysts is capturing other analyst characteristics that may factor into mutual funds' commission allocation decisions. For example, Jackson (2005) finds that the reputation and visibility of sell-side analysts are important determinants of broker market share of equity commissions. As a result, we include a wide array of variables to capture these analyst traits, such as All-star status (*%All-Star Analyst Coverage*) (Jackson, 2005; Clarke, Khorana, Patel and Rau, 2007;Maggio, Egan and Franzoni, 2019), high general forecasting experience (*% High General Experience Analyst Coverage*) (Juergens and Lindsey, 2009; Choi et al., 2009; Groysberg, Healy and Maber, 2011), large portfolio size (*% Large Portfolio Analyst Coverage*) (Hong and Kubik, 2003; Groysberg, Healy and Maber, 2011), and high frequency and timeliness rank for earnings forecasts (*%Frequent Forecaster Analyst Coverage, % Leader Analyst Coverage*) (Hong, Kubik and Solomon, 2000; Clarke et al., 2007).[23] To the extent there may be unobserved time-invariant broker characteristics that are correlated with commission allocation decisions of buy-side investors, we control for broker fixed effects as well as year fixed effects. We adjust standard errors for heteroskedasticity and fund-level clustering. To mitigate reverse causality concerns, we lag independent variables by one year, but the results are similar if we measure all variables contemporaneously. Summary statistics of the control variables discussed above are in Appendix Table 1. Formally, our model is specified as follows:

$$\textit{Broker Share}_{ijt} = \beta_1(\%\ \textit{Analyst Coverage}) \ [\textit{or}\ \beta_2(\%\ \textit{Related Experienced Analyst Coverage}) + \beta_3(\%\ \textit{Unrelated Experienced Analyst Coverage}) + \beta_4(\%\ \textit{Inexperienced Analyst Coverage})] + \textit{Controls} + \textit{Broker, Year Dummies} + \varepsilon \quad (1)$$

****Table 7 here****

Table 7 reports the regression results. Model 1 includes our first primary variable of interest *(% Analyst Coverage)* and other controls. Consistent with broker commissions responding to analyst research, we find that the coefficient on *% Analyst Coverage* is positive and significant. Direction and significance of other controls are roughly in line with the evidence reported in prior work. For instance, our results reveal that the prior-period commission share is economically the most important determinant of the current-year commission allocations (Goldstein et al., 2009). Brokerage houses affiliated with investment banks that have underwritten equity offerings for more firms in a mutual fund's portfolio also receive larger commission shares.

[23] An analyst's general forecasting experience (portfolio size) is defined as high (large) if the total number of years that the analyst forecasted (number of firms in coverage portfolio) in *I/B/E/S* is above the sample median. To compute timeliness (frequency), we rank analysts based on the time they issue their first earnings forecasts (number of revisions on earnings earnings) in a given year using the ranking methodology of Hong, Kubik and Solomon (2000). Sell-side analysts are classified as lead (frequent) forecasters if their timeliness (frequency) ranks are above the sample median.

In model 2, we decompose the total analyst coverage into coverage by analysts with related industry work experience, unrelated industry work experience, and no prior work experience. Our results indicate that that the marginal impact of analyst coverage on broker commission shares is most pronounced for analysts possessing related pre-analyst industry work experience. A one standard deviation increase in industry expert analyst coverage translates into 0.10% (t-stat=10.1) higher broker commissions in the following year, compared to 0.05% (t-stat=2.11) for analysts with only unrelated experience and 0.01% (t-stat=0.51) for inexperienced analysts. We are also able to reject the hypothesis that the effect of industry expert analyst coverage is the same as other analysts. The economic effect of industry expert analyst coverage is larger than any other analyst characteristics. To put this result in perspective, for instance, a one standard deviation increase in coverage by analysts with All-star status (or Large portfolios) is associated with 0.07% (or 0.08%) higher commission allocations to employing brokers.

Prior research has also shown that extreme changes in recommendations and earnings estimates, and issuance of optimistic forecasts and recommendations may influence brokerage-firm trading (e.g. Irvine, 2004, Juergens, 2009). We thus re-estimate equation 1 with the inclusion of variables related to such forecasting behavior (*% Bold Analyst Coverage, % Optimistic Analyst Coverage*,) and find that our findings are largely unchanged (see model 3).

Another relevant concern is that industry work experience may be correlated with the forecasting analyst's innate talent. To mitigate this concern, in model 4, we include a host of observable analyst characteristics that may be correlated with talent. These include analysts graduating from an Ivy League institution at any academic level (*% Ivy League Grad Coverage*), holding MBA degrees (*% MBA)* and making superior earnings forecasts *(% High Accuracy Analyst Coverage*).[24] Our findings persist after the inclusion of these controls.

To ensure that our results from the broker commission allocation analysis are not driven by any time-invariant fund characteristics, we augment equation (1) by including mutual fund fixed effects. Results from models 5 reaffirm our earlier findings. In model 6, we also include fixed effects for all fund-year pairs, essentially examining the relation between analyst coverage and the commission allocation decision by the same fund at the same point in time. Our results continue to hold.[25]

[24] High accuracy analysts are defined as those with above-median accuracy scores computed following Hong and Kubik (2003).
[25] In unreported analysis, we take into account the dollar investment in each stock in a fund's portfolio and re-define analyst coverage variables based on the proportion of portfolio dollar investments in stocks covered by each type of analysts. Our results are robust.

Overall, the analysis in this section suggests that buy-side investors indeed value the industry knowledge of sell-side analysts and reward brokers for such service. The impact of this analyst trait exceeds that of other analyst characteristics, which is consistent with the viewpoints from the *II* magazine polls and practitioner surveys. As such, we further the understanding of how sell-side analyst services and commission payments are exchanged.

5.2. Identification

Similar to our performance analyses, a potential econometric concern with our commission allocation analysis is that the extent and type of analyst coverage that a mutual fund's portfolio firms receive from a particular brokerage firm may not be random. For example, brokerage firms may provide more industry expert coverage for portfolio firms of buy-side clients from whom they historically receive higher commissions. Alternatively, buy-side investors may gear their portfolios toward stocks covered by industry expert analysts employed by their brokers. Even though both of these possibilities are consistent with the notion that access to industry expert analysts is valuable to buy-side institutions, they pose difficulties to a causal interpretation of the results from the baseline regressions. To mitigate endogeneity and reverse causality related concerns, we use a dynamic setting similar to that in Section 3. If a client fund loses industry expert analyst coverage on its stockholding firms and client research services by these analysts are indeed valued, we expect this client fund to respond by reducing commissions allocated to the broker losing the industry expert analyst. In an attempt to eliminate common influences that affect similar funds at the same time, we employ a difference-in-differences (DiD) approach. Given that not all client funds of a brokerage firm are affected by the departure of a particular analyst, the non-impacted client funds serve as an ideal control group with the impacted client funds as the treatment group for our DiD approach. In this methodology, we compare the changes in commission share of treatment client mutual funds experiencing a loss of analyst coverage on their holdings firms with *changes* in that of control client funds which employ the same broker but did not experience a loss of analyst coverage in the year before and after. To ascertain treatment and control client funds are similar in the pre-event year, we match treatment funds to control funds by their relative commission shares, investment banking affiliation and the percentage of portfolio firms receiving analyst coverage. In particular, we require treatment and control funds to be in the same quartile based on each of these characteristics in year t-1. We then retain the candidate control fund that has the smallest difference in the percentage of analyst coverage compared to the treatment fund. Next, we examine the effect of analyst coverage loss on commission commitments by computing the mean *changes* in broker shares from year t-1 to year t+1 for

our treatment funds (treatment difference), control funds (control difference) as well as the difference between changes in treatment and control funds (difference-in-differences). We also compute differences in DiD across funds losing industry expert analysts and other analysts.

Panel B of Table 7 reports the mean differences. We find that treatment funds decrease their broker commission shares by 0.22% in the year following the departure of analysts covering their stocks compared to the levels in the pre-analyst loss period. This is economically important given that the mean (median) %*Broker share* of these brokers is 10.3% (9.7%) for treatment funds in the pre-event year. Conversely, the control funds' commission commitments to the same brokerage houses do not change over the same time period. In column 2 and 3, we decompose the loss of analyst coverage into the loss of industry expert analysts and other analysts. We find that the mean DiD in broker commission allocations is -0.72% (-0.19%) following the departure of industry expert analysts (other analysts). The last column in Panel B examines the difference in DiD between funds losing industry expert analysts and other analysts and shows that the loss of industry expert analyst coverage leads to more pronounced reductions in broker commitments (Difference in DiD=-0.53%).[26]

In a potentially more exogenous setting, we consider the same subsample of analyst departures used in Panel C of Table 4. Panel C of Table 7 continues to show that the marginal impact of industry expert analysts significantly exceeds that of other analysts (Difference in DiD=-0.62%).[27]

5.3. Additional analysis

In this section, we take advantage of the granularity of the institutional transaction-level data available from Ancerno and examine funds' commission allocation at each individual stock level. In untabulated results, we first show that all else being equal, funds are more likely to channel trades on a stock to brokers that provide industry expert analyst coverage on the stock. This is consistent with our earlier finding based on funds' N-SAR filings. However, one interesting fact that we observe from the trade-level data is that funds sometimes route trades in stocks to brokers that do not provide industry expert analyst coverage on those stocks, which seems puzzling given our evidence on the importance of access to analyst industry expertise for fund performance.

[26] We also consider the magnitude of loss in analyst coverage resulting from analyst departures and find that the impact of industry expert analyst loss is higher (lower) when a larger (smaller) proportion of mutual fund holdings are affected by this loss.

[27] To circumvent the mechanical relation between analyst loss from broker mergers and changes in commission allocation arising from target brokers disappearing following the merger, we focus only on the analysts that are employed by the *acquiring* brokers in year t-1 and require such brokers to exist in year t+1.

To shed light on this issue, we investigate trading commission allocations for fund-stock pairs across brokerage houses. In particular, we look at the availability of industry expert analyst coverage from other brokers on a particular stock held by a fund and examine how it affects the same fund's selection of a broker providing only non-expert coverage on the *same* stock. The lack of expert analyst coverage provided by other brokers on this stock may make it more likely for the fund to execute trades through brokers providing only non-expert analyst coverage. Furthermore, we consider the indirect compensation for industry expert analyst coverage provided on the same fund's *other* stocks. Prior work also suggests that client funds may reward brokers for research services by allocating commissions on other stock transactions (e.g., O'Brien and Bhushan, 1990; Irvine, 2001; Maber, Groysberg, and Healy, 2014). Our presumption is that it is more likely to observe funds allocate trading commissions on a stock to a broker providing only non-expert analyst coverage if the broker offers industry expert analyst coverage on a greater percentage of the rest of the fund's portfolio firms.

We estimate a logistic regression and investigate the likelihood of a fund allocating commissions on a stock to a broker providing only non-expert analyst coverage for that stock. Our first key independent variable, *%Related Experienced Analyst Coverage-other client stocks,* aims to capture the indirect compensation channel and equals the fraction of other stocks in the fund's portfolio that receive industry expert analyst coverage from the broker. Our second key independent variable captures the availability of industry expert analysts on the focal stock from other brokers (*Related Experienced Analyst coverage-other brokers*) and it is equal to one if industry expert analyst coverage on the stock exists from other brokers, and zero otherwise. We also control for various analyst and broker characteristics as in equation 1 and include broker and year fixed effects.

****Table 8 here****

Table 8 presents the results. Model 1 shows that the coefficient on *Related Experienced Analyst coverage-other brokers* is significantly negative. In economic terms, coverage by industry expert analysts at other brokers reduces the likelihood of funds allocating commissions to a broker providing only non-expert analyst research services by 33.4%. In model 2, the coefficient estimate on *%Related Experienced Analyst Coverage-other client stocks* is significantly positive, implying that client funds may indirectly reward the brokers for providing industry expert analyst coverage on other stocks in their investment portfolios. Other control variables have expected signs. In sum, these results suggest that trading commission allocations for non-expert analyst coverage may be likely due to shortage in industry expert analyst

coverage available from other brokers as well as indirect compensation for expert coverage offered on stocks in the fund's portfolio.[28]

6. Conclusion

Mutual funds are prominent consumers of sell-side analyst research services and allocate billions of dollars in soft-dollar commissions to brokerage houses for premier research services. While soft-dollar payments represent an economically significant cost to fund investors, little is known about the investment value generated by these payments. Answers to this question take on greater importance as the sweeping MiFID II regulation took effect in Europe at the beginning of 2018 and reverberates around the world. A key provision of the regulation mandates disclosure and justification by fund managers of payment for investment research, which calls for fund companies and brokerage firms agreeing on how to price research services provided by analysts. In addition, the investment value of sell-side research is of interest to fund companies because many of them plan to absorb the research expense themselves rather than passing it onto fund investors.

In the absence of data that link mutual fund trades to investment ideas obtained with soft dollars, determining whether and how much fund investors benefit from sell-side research is challenging. We overcome this challenge by proposing a unique identification strategy that allows us to zero in on mutual fund transactions that ex ante, are likely to be triggered by sell-side research. Our strategy relies on the findings from practitioner surveys and *II* magazine annual polls, which consistently indicate that industry knowledge is the most important research service provided by sell-side analysts.

Exploiting a hand-collected novel biographical data on a large sample of sell-side analysts and mutual fund broker commission payment data during the period of 1999 to 2010, we find that mutual funds generate economically and statistically higher abnormal returns on stocks with access to research produced by industry expert analysts compared to stocks that are held by the same fund but lack industry expert analyst coverage. Further results suggest that research by industry expert analysts leads to significantly higher returns for commission paying funds (VIP clients) relative to funds not paying commissions (non-VIP clients), underlining the value of premium analyst client services for investment performance.

[28] Other possible reasons for funds to not always use brokers providing industry expert analysts coverage for their portfolio firms include: (1) for non-information based trades, e.g., routine portfolio rebalancing, funds usually trade through the lowest execution cost brokers, and (2) funds intentionally spread their trades across several brokers to conceal their private information and trading strategy.

To rule out the possibility that our results are driven by unobservable broker, fund, and stock specific characteristics, we exploit external shocks to analyst coverage arising from analyst job changes, broker mergers, and analyst retirements/deaths. We find that losing analyst coverage on fund holdings reduces fund performance on these affected holdings, but the deterioration in fund performance is more pronounced in stocks losing coverage by industry expert analysts from fund brokers.

Our analysis reveals interesting cross-sectional variations in the investment value from industry expert analysts. In particular, we find that funds benefit more from having access to industry expert analysts who possess higher quality industry knowledge and who have connections to coverage firms' management. Industry expert analysts also confer greater benefits to fund performance in stocks that are subject to more influence from industry fundamentals. In addition, client funds place higher bets on stocks for which they have access to analyst industry expertise from their brokers.

Finally, we examine whether mutual funds reward brokerage firms for the higher abnormal return they generate from having access to industry expertise. Our analysis of funds' commission allocation data shows that mutual funds allocate larger shares of commissions to brokerage firms that provide industry expert analyst coverage on a greater proportion of fund portfolio holdings.

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Table 1. Summary statistics

This table reports summary statistics on the number of unique mutual funds and portfolio holding firms, analyst coverage according to pre-analyst industry work experience for a sample of diversified, actively managed equity mutual funds with broker commission information available from N-SAR semi-annual filings. % Analyst coverage, % Related Experienced Coverage, % Unrelated Experienced coverage, % Inexperienced coverage are the percentage of coverage provided by any analyst, analysts with related (unrelated) industry work experience, analysts without work experience for mutual fund portfolio holding firms, respectively. % Funds and % Stocks is the percentage of mutual fund and portfolio holding firms representing the overall 'clean' merged Thomson Financial CDA/CRSP Mutual universe of US funds/firms. Broker commission data are from N-SAR semi-annual reports filed with the Securities and Exchange Commission (SEC). Mutual fund data are from merged Thomson Financial CDA/ Spectrum and CRSP Mutual Fund Database. Analyst data are from *I/B/E/S*, stock price data are from CRSP, and firm characteristics are obtained from Compustat. Analyst employment history is collected from *LinkedIn.com* and supplemented with *Zoominfo.com*.

Year	N Mutual Funds	N Portfolio Holding Firms	% Analyst Coverage	% Related Experienced Coverage	% Unrelated Experienced Coverage	% Inexperienced Coverage	% Mutual Funds	% Portfolio Holding Stocks
Overall	4,544	13,634	32.24	8.07	29.95	24.77	54.81	82.46
1,999	1,557	6,232	28.50	2.50	22.35	18.63	46.38	78.01
2,000	1,642	6,865	25.59	2.43	20.13	17.79	41.39	83.23
2,001	1,796	6,204	26.45	3.32	22.18	18.65	65.88	89.61
2,002	1,902	5,968	27.93	4.24	24.30	20.16	62.32	88.84
2,003	1,910	5,630	30.39	5.47	26.52	21.99	52.43	84.79
2,004	1,861	4,913	39.06	7.39	34.44	28.17	62.18	74.04
2,005	2,075	4,981	39.33	7.11	35.09	27.79	75.48	80.42
2,006	1,693	5,058	41.38	8.32	37.96	28.77	67.40	83.00
2,007	1,934	5,092	41.18	8.86	38.49	28.50	75.55	83.48
2,008	2,135	4,945	38.08	9.26	35.65	26.41	70.67	83.73
2,009	2,114	4,808	37.31	8.65	35.11	26.46	76.98	86.30
2,010	1,998	4,851	38.98	9.34	36.90	28.06	55.83	84.76

Table 2. Analyst Coverage and Mutual Funds' Monthly Portfolio Holding Performance

Panel A of this table reports mean monthly value-weighted portfolio holding returns for mutual funds' stocks according to analyst coverage provided by brokers receiving commission allocations. A firm k is included in mutual fund i's portfolio at the beginning of quarter t and held between quarter t and t+1. Each within-fund portfolio is rebalanced at the beginning of quarter t+1 in accordance with updated analyst coverage from fund i's brokers. Abnormal performance is measured based on the Daniel, Grinblatt, Titman and Wermers (DGTW) (1997) characteristic-adjusted returns. The dollar value of an investment position in firm k by mutual fund i is used as the weight to calculate value-weighted returns. Panel B reports analogous holding returns by type of expert coverage and clients. ***, ** and *denote significance at 1%, 5%, and 10%, respectively.

Panel A: Performance differences across fund holdings with different types of analyst coverage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	No analyst from fund brokers	Any analyst from fund brokers	Difference (2) - (1)	Related Experienced analysts from fund brokers	Difference (4) – (1)	Other analysts from fund brokers	Difference (6) - (1)	Difference (4) – (6)
Raw Ret	0.31***	0.49***	0.19***	0.66***	0.35***	0.48***	0.18***	0.17**
	(10.50)	(12.90)	(6.25)	(8.20)	(4.46)	(12.78)	(5.99)	(2.17)
DGTW Ret	-0.07***	0.04*	0.11***	0.21***	0.28***	0.03	0.11***	0.18***
	(-5.87)	(1.82)	(4.91)	(3.39)	(4.49)	(1.53)	(4.92)	(2.78)

Panel B: Performance differences across fund holdings with differential access to analyst expertise: Fund Brokers vs. Other Brokers and VIP vs. Non-VIP clients

	(1)	(2)	(3)	(4)	(5)	(6)
	Related Experienced from fund brokers	Related Experienced from other brokers	Difference (1)-(2)	Related Experienced from fund brokers-VIP client	Related Experienced from fund brokers-Non-VIP client	Difference (4)-(5)
Raw Ret	0.66***	0.41***	0.24***	0.86***	0.54***	0.32**
	(8.20)	(11.76)	(3.09)	(8.02)	(5.32)	(2.12)
DGTW Ret	0.21***	0.04**	0.17***	0.37***	0.17**	0.20*
	(3.39)	(2.32)	(2.64)	(4.52)	(1.98)	(1.72)

Table 3. **Cross-Sectional Variations in the Investment Value of Analyst Industry Expertise**

This table reports mean monthly value-weighted portfolio holding returns for client funds' stocks according to analyst coverage provided from brokers receiving commission allocations. A firm k is included in the mutual fund i's corresponding portfolio at the beginning of quarter t and held between quarter t and t+1. Each within-fund portfolio is rebalanced at the beginning of quarter t+1 in accordance with updated analyst coverage from fund i's brokers. Difference portfolios are at within-fund portfolio level and represent performance comparison of stocks receiving the corresponding analyst coverage. Measures of abnormal stock performance are based on Daniel, Grinblatt, Titman and Wermers (DGTW) (1997)'s characteristic adjusted returns. The dollar value of an investment position in firm k by mutual fund i is used as the weight to calculate value-weighted returns. ***, ** and *denote significance at 1%, 5%, and 10%, respectively.

Panel A: Related Experienced Analysts and Quality of Industry Experience: Experience Length and All-star Status

	Long industry work experience	Short industry work experience	Difference	All-star	Non-Star	Difference
	(1)	(2)	(3)	(4)	(5)	(6)
Raw Ret	0.69***	0.32***	0.38***	0.90***	0.55***	0.35***
	(8.24)	(4.10)	(3.48)	(9.92)	(6.37)	(2.96)
DGTW Ret	0.26***	0.11*	0.15*	0.30***	0.11*	0.19*
	(4.06)	(1.81)	(1.76)	(4.13)	(1.66)	(1.89)

Panel B: Related Experienced Analysts and Quality of Industry Experience: Stock Recommendations and Earnings Forecasts

	High Recommendation Profitability	Low Recommendation Profitability	Difference	High Forecast Accuracy	Low Forecast Accuracy	Difference
	(1)	(2)	(3)	(4)	(5)	(6)
Raw Ret	0.88***	0.61***	0.27**	0.79***	0.43***	-0.36***
	(11.13)	(5.59)	(2.07)	(9.21)	(5.13)	(-3.11)
DGTW Ret	0.50***	0.20**	0.30***	0.38***	0.14**	-0.24***
	(8.41)	(2.18)	(2.74)	(5.71)	(2.17)	(-2.66)

Panel C: Related Experienced Analysts and Industry Homogeneity

	High EPS synch	Low EPS synch	Difference	High ret synch	Low ret synch	Difference	High ret corr	Low ret corr	Difference
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Raw Ret	0.94***	0.39***	0.55***	0.96***	0.66***	0.30**	1.11***	0.61***	0.51***
	(8.42)	(3.66)	(3.59)	(8.22)	(6.94)	(2.01)	(9.77)	(5.82)	(3.30)
DGTW Ret	0.66***	0.20**	0.46***	0.53***	0.18**	0.35***	0.43***	0.19**	0.24**
	(7.56)	(2.33)	(3.79)	(6.48)	(2.11)	(2.93)	(5.26)	(2.27)	(2.10)

Panel D: Related Experienced Analysts and Access to Management

	Connected	Non Connected	Difference	1st EC Q	Non 1st EC Q	Difference	Takeaway Rpt	Non takeaway Rpt	Difference
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Raw Ret	0.91***	0.59***	0.31**	1.25***	0.64***	0.61**	1.26***	0.61***	0.66***
	(7.26)	(6.67)	(2.03)	(4.30)	(7.85)	(2.02)	(9.37)	(7.29)	(4.14)
DGTW Ret	0.50***	0.17**	0.33***	0.75***	0.20***	0.56**	0.44***	0.19***	0.25**
	(5.26)	(2.48)	(2.84)	(3.65)	(3.12)	(2.59)	(4.42)	(2.97)	(2.07)

Table 4. Analyst Coverage and Mutual Funds' Monthly Trading Performance

This table reports mean monthly value-weighted trading performance for client funds' stocks according to analyst coverage provided from brokers receiving commission allocations. For each holding quarter, we classify a stock as net buy (sell) if the change in the portfolio weight for firm k is positive (negative) from the beginning to the end of a quarter t for mutual fund i. Each within-fund portfolio is rebalanced at the beginning of quarter t+1 in accordance with updated analyst coverage from fund i's brokers and updated trade direction on firm k for fund i. Difference and Long-Short (L-S) portfolios are at within-fund portfolio level and represent performance comparison of stocks receiving the corresponding analyst coverage. Measures of abnormal stock performance are based on Daniel, Grinblatt, Titman and Wermers (DGTW) (1997)'s characteristic adjusted returns. The dollar value of an investment position in firm k by mutual fund i is used as the weight to calculate value-weighted returns. ***, ** and *denote significance at 1%, 5%, and 10%, respectively.

Panel A: Raw and Abnormal Trading Performance: Long (Buys) - Short (Sells)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Related Experienced from fund brokers	No analyst from fund brokers	Other analyst from fund brokers	Related Experienced vs No analyst (1)-(2)	Related Experienced vs Other analyst (1)-(3)	Related Experienced from fund vs from other brokers	Related Experienced from fund brokers: VIP vs Non-VIP clients
Raw	0.44***	0.05	0.07	0.39***	0.37***	0.26**	0.34*
	(5.36)	(1.19)	(1.04)	(4.27)	(3.63)	(2.55)	(1.66)
DGTW	0.28***	0.06*	0.01	0.22***	0.27***	0.18**	0.34*
	(4.21)	(1.81)	(0.14)	(2.95)	(3.19)	(2.20)	(1.86)

Panel B: DiD and Analyst Departures: Long (Buys) - Short (Sells)

		Overall	Lost Related Experienced Analyst	Lost Other Analyst	Difference
Raw	Mean DID	-0.29***	-1.17***	-0.23**	0.95**
		(-2.96)	(-3.21)	(-2.23)	(2.42)
DGTW	Mean DID	-0.22***	-0.95***	-0.17*	0.77**
		(-2.59)	(-2.89)	(-1.93)	(2.22)

Panel C: DiD and Analyst Departures: Broker and Analyst Events and Long (Buys)- Short (Sells)

		Overall	Lost Related Experienced Analyst	Lost Other Analyst	Difference
Raw	Mean DID	-0.35**	-1.26**	-0.28*	0.99*
		(-2.22)	(-2.36)	(-1.65)	(1.76)
DGTW	Mean DID	-0.20	-1.02**	-0.13	0.89*
		(-1.43)	(-2.27)	(-0.88)	(1.88)

Table 5: Analyst Coverage and Mutual Funds' Monthly Trading Performance Using Ancerno Data

This table presents results for client fund trade performance using institutional transaction data from Ancerno Ltd. Panel A presents OLS regression results for the overall Ancerno Sample. Panel B re-estimates the results by excluding trades that are executed immediately before analyst reports. See the Appendix for a description of control variables. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

Panel A: Raw and Abnormal Trading Performance: Long (Buys) - Short (Sells)

	(1)	(2)	(3)	(4)	(5)
	Related Experienced from fund brokers	Related Experienced vs No analyst	Related Experienced vs Other analyst	Related Experienced from fund brokers vs other brokers:	Related Experienced from fund brokers: VIP vs Non-VIP clients
Raw	0.81***	0.60***	0.50***	0.54***	0.48***
	(17.91)	(8.74)	(9.67)	(11.49)	(5.92)
DGTW	0.48***	0.29***	0.16***	0.19***	0.23***
	(9.36)	(4.15)	(3.06)	(3.81)	(3.80)

Panel B: Raw and Abnormal Trading Performance: Long (Buys) - Short (Sells), with pre-analyst report trades removed

	(1)	(2)	(3)	(4)	(5)
	Related Experienced from fund brokers	Related Experienced vs No analyst	Related Experienced vs Other analyst	Related Experienced from fund brokers vs other brokers:	Related Experienced from fund brokers: VIP vs Non-VIP clients
Raw	0.80***	0.60***	0.48***	0.49***	0.36***
	(17.77)	(8.77)	(9.32)	(9.88)	(3.96)
DGTW	0.45***	0.27***	0.13**	0.13**	0.21**
	(8.79)	(3.81)	(2.41)	(2.28)	(2.55)

Table 6: Analyst Coverage and Client Mutual Fund Portfolio Allocation Behavior

This table presents results for client fund portfolio allocation behavior. Panel A presents OLS regression results for stock-level fund portfolio weight and analyst coverage offered on fund portfolio holding firms. Panel B reports the effect of losing analysts emanating from analyst departures on the change in client funds' portfolio allocations. Panel C reports the effect on fund allocation decisions of analyst loss due to broker mergers, and analyst retirements and deaths. See the Appendix for a description of control variables. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

Panel A: Fund Stock Portfolio Allocations

Analyst Coverage	0.02***	
	(13.85)	
Related Experienced Coverage		0.02***
		(8.71)
Unrelated Experienced Coverage		0.01***
		(4.79)
Inexperienced Coverage		0.00***
		(3.08)
R2	63.71%	63.71%
N	2,682,375	2,682,375
Fund, Quarter FE	Y	Y

Panel B. DiD and Analyst Departures

	Lost Analyst Coverage	Lost Related Experienced Analyst	Lost Other Analyst	Difference
Mean Treatment Difference (Year T+1 vs T-1)	-0.03***	-0.09***	-0.02***	-0.06***
	(-5.26)	(-3.68)	(-4.41)	(-2.58)
Mean Control Difference (Year T+1 vs T-1)	0.00	-0.01	0.00	-0.01
	(-0.14)	(-0.85)	(0.08)	(-0.84)
Mean DiD (Treatment vs Control)	-0.03***	-0.07***	-0.02***	-0.05**
	(-4.88)	(-3.11)	(-4.21)	(-2.00)

Panel C. DiD and Analyst Departures: Broker and Analyst Events

	Lost Analyst Coverage	Lost Related Experienced Analyst	Lost Other Analyst	Difference
Mean Treatment Difference (Year T+1 vs T-1)	-0.03***	-0.15***	-0.02**	-0.12***
	(-3.38)	(-4.23)	(-2.31)	(-3.42)
Mean Control Difference (Year T+1 vs T-1)	0.00	-0.04	0.00	-0.04
	(-0.55)	(-1.26)	(-0.15)	(-1.19)
Mean of DiD (Treatment vs Control)	-0.03***	-0.11***	-0.02**	-0.09**
	(-3.08)	(-2.88)	(-2.29)	(-2.23)

Table 7. Mutual Fund Broker Commission Allocations and Analyst Coverage

Panel A presents OLS regression where the dependent variable is the commission share of a broker for a mutual fund, which is defined as total commissions allocated to broker j for mutual fund i during period t scaled by total broker commissions across all brokers for the same mutual fund i at the same point in time. The primary variables of interest are *% Analyst Coverage, % Related Experienced Coverage, % Unrelated Experienced Coverage and % Inexperienced Coverage*, which represent the percentage of MF *i*'s portfolio holding firms that are covered by broker *j*'s analysts, analysts with related and unrelated industry experience or no work experience, respectively. See the Appendix for a description of control variables. Panel B and C report the effect of analyst departures on changes in the client funds' brokerage commission allocations. The first column provides the cross-sectional means of mean treatment difference, mean control difference and difference-in-differences (DiD) for the full sample of treatment client funds affected by the loss of analyst coverage. Control client funds are matched by their relative commission share, investment bank affiliation and percentage of analyst coverage in year t-1. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

Panel A: Panel regressions

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
% Analyst Coverage	0.89***					
	(7.58)					
% Related Experienced Analyst Coverage		2.15***	2.24***	2.33***	2.40***	2.36***
		(8.10)	(8.02)	(7.94)	(16.82)	(16.41)
% Unrelated Experienced Analyst Coverage		0.72***	0.80***	0.87***	0.93***	0.92***
		(5.74)	(5.23)	(4.82)	(10.62)	(10.41)
% Inexperienced Analyst Coverage		0.82***	0.91***	0.95***	1.07***	1.06***
		(5.05)	(4.90)	(4.71)	(10.40)	(10.22)
Top 10 Broker	0.37***	0.37***	0.37***	0.37***	0.31***	0.29***
	(33.86)	(33.95)	(34.06)	(34.23)	(38.76)	(36.76)
% Lag (Broker share)	43.06***	43.06***	43.05***	43.06***	42.99***	43.13***
	(43.42)	(43.41)	(43.42)	(43.41)	(651.91)	(654.12)
% Affiliated Investment Bank	0.40***	0.40***	0.40***	0.39***	0.41***	0.42***
	(3.15)	(3.17)	(3.16)	(3.15)	(8.71)	(8.73)
Same Industry Expertise	0.06***	0.06***	0.06***	0.06***	0.05***	0.05***
	(3.81)	(3.61)	(3.64)	(3.68)	(4.09)	(3.95)
% All-Star Analyst Coverage	0.84***	0.90***	0.89***	0.87***	0.90***	0.89***
	(4.57)	(4.94)	(4.91)	(4.78)	(11.76)	(11.60)
% Leader Analyst Coverage	0.51	0.50	0.52	0.54	0.26	0.30
	(1.34)	(1.34)	(1.39)	(1.44)	(1.19)	(1.36)
% Frequent Forecaster Analyst Coverage	-0.01	-0.04	-0.01	-0.01	-0.05	-0.03
	(-0.08)	(-0.27)	(-0.09)	(-0.07)	(-0.63)	(-0.42)
% High General Experience Analyst Coverage	0.30**	0.31**	0.31**	0.33**	0.34***	0.33***
	(2.29)	(2.26)	(2.28)	(2.38)	(4.80)	(4.63)
% Large Portfolio Analyst Coverage	0.36***	0.42***	0.44***	0.45***	0.38***	0.39***
	(2.80)	(3.29)	(3.44)	(3.51)	(5.52)	(5.58)
% Optimistic Analyst Coverage			-0.33**	-0.32*	-0.42***	-0.43***
			(-1.99)	(-1.95)	(-4.61)	(-4.59)
% Bold Analyst Coverage			-0.04	-0.02	-0.06	-0.08

			(-0.23)	(-0.11)	(-0.61)	(-0.78)
% MBA Analyst Coverage				-0.22*	-0.22***	-0.23***
				(-1.74)	(-3.22)	(-3.26)
% High accuracy Analyst Coverage				-0.04	0.03	0.07
				(-0.28)	(0.35)	(0.71)
% Ivy Graduate Analyst Coverage				0.12	0.21**	0.22***
				(0.76)	(2.56)	(2.76)
H_o: Related = Inexperienced		1.43***	1.44***	1.46***	1.47***	1.33***
H_o: Related = Unrelated		1.33***	1.33***	1.37***	1.33***	1.44***
H_o: Related = All-Star		1.25***	1.34***	1.45***	1.51***	1.47***
R^2	42.00%	42.01%	42.01%	42.01%	43.70%	42.01%
N	1,143,297	1,143,297	1,143,297	1,143,297	1,143,297	1,143,297
Broker, Year Fixed Effects	Y	Y	Y	Y	N	N
Broker, Year, Fund Fixed Effects	N	N	N	N	Y	N
Broker, Fund-Year Fixed Effects	N	N	N	N	N	Y

Panel B. DiD and Analyst Departures

	Lost Analyst Coverage	Lost Related Exp. Analyst Coverage	Lost Other Analyst Coverage	Difference
Mean Treatment Client Fund Difference (Year T+1 vs T-1)	-0.22***	-0.74***	-0.18***	-0.55***
	(-12.62)	(-10.88)	(-10.25)	(-7.89)
Mean Control Client Fund Difference (Year T+1 vs T-1)	0.00	-0.02	0.01	-0.02
	(0.24)	(-0.34)	(0.33)	(-0.42)
Mean of DiD (Treatment vs Control Client Fund)	-0.22***	-0.72***	-0.19***	-0.53***
	(-9.87)	(-8.22)	(-8.12)	(-5.83)

Panel C. DiD and Analyst Departures: Broker and Analyst Events

	Lost Analyst Coverage	Lost Related Exp. Analyst Coverage	Lost Other Analyst Coverage	Difference
Mean Treatment Client Fund Difference (Year T+1 vs T-1)	-0.24***	-0.84***	-0.20***	-0.64**
	(-3.26)	(-3.45)	(-2.67)	(-2.50)
Mean Control Client Fund Difference (Year T+1 vs T-1)	0.00	-0.02	0.00	-0.02
	(0.04)	(-0.07)	(0.06)	(-0.09)
Mean of DiD (Treatment vs Control Client Fund)	-0.24***	-0.82***	-0.21**	-0.62**
	(-2.98)	(-2.75)	(-2.48)	(-1.98)

Table 8. Fund Allocation of Trades to Brokers Not Providing Industry Expert Analyst Coverage

This table presents results from logit regressions where the dependent variable is equal to one if a mutual fund directs trades on a stock to a broker that does not provide industry expert analyst coverage on the stock. Data used for this analysis are from the Ancerno institutional transaction database. See the Appendix for a description of all variables. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

	Model 1	Model 2	Model 3
Related Experienced Analyst coverage-other brokers	-29.49***	-29.45***	-29.63***
	(-64.39)	(-64.16)	(-64.55)
% Related Experienced Analyst Coverage-Other client fund stocks	33.23***	33.57***	33.58***
	(135.51)	(136.24)	(136.15)
Affiliated Broker	18.66***	19.12***	20.18***
	(9.72)	(9.96)	(10.51)
Top 10 Broker	-9.14***	-8.94***	-8.72***
	(-10.04)	(-9.80)	(-9.56)
Same Industry Expertise	8.11***	8.43***	8.51***
	(16.03)	(16.63)	(16.79)
% Lag (Broker share)	40.85***	40.86***	40.90***
	(122.37)	(122.29)	(122.35)
All-star Analyst		14.71***	14.86***
		(20.21)	(20.41)
Leader Analyst		2.61***	2.74***
		(3.12)	(3.27)
Frequent Forecaster Analyst		0.73*	0.25
		(1.71)	(0.59)
High General Experience Analyst		4.04***	4.26***
		(8.76)	(9.18)
Large Portfolio Analyst		5.04***	4.87***
		(9.79)	(9.46)
Optimistic Analyst		-0.53	-0.35
		(-0.74)	(-0.49)
Bold Analyst		2.29**	2.24**
		(2.54)	(2.48)
MBA Analyst			-15.53***
			(-35.46)
High accuracy Analyst			1.34***
			(3.04)
Ivy Graduate Analyst			8.21***
			(15.18)
Broker, Year Fixed Effects	Y	Y	Y
R^2	38.84%	38.86%	38.91%
N	1,557,088	1,557,088	1,557,088

Appendix Table 1: Summary statistics on control variables used in the broker commission allocation analysis.

The table below reports summary statistics on a set of analyst and broker characteristics for mutual fund portfolio holding firms. Variable definitions are in the appendix. We find that 27.7% of mutual fund portfolio firms have coverage from analysts employed at top 10 brokers (*Top 10 Broker*) and 8.2% of portfolio firms have covering analysts employed at brokerage houses affiliated with investment banks underwriting the coverage firm's IPO or SEO (*Affiliated Investment Bank*). About 29.12% of firms have coverage from sell-side analysts at brokers sharing the same industry expertise as the funds investing in these firms (*Same Industry Expertise*). In addition, 10.6% (10.9%) of fund stockholding firms have All-star (Leader) analyst coverage, 26.2% (26.3%) of these firms are followed by analysts with above median general forecasting experience and portfolio size. Finally, about 18.4% (6.6%) of fund firms have coverage from analysts providing optimistic (bold) recommendations and earnings forecasts.

Year	Top 10 Broker	Affiliated Investment Bank	Same Industry Expertise	All-Star Analyst	Leader Analyst	Frequent Forecaster Analyst	High General Experienced Analyst	Large Portfolio Analyst	Optimistic Analyst	Bold Analyst
Overall	27.72	8.28	29.12	10.66	10.90	24.55	26.21	26.34	18.46	6.60
1999	22.56	11.75	22.45	10.00	7.30	15.23	20.84	21.18	13.21	2.52
2000	20.74	10.34	21.82	8.51	6.16	14.81	19.78	18.66	14.03	1.73
2001	22.15	8.78	24.39	11.43	7.51	17.55	21.37	21.18	15.43	2.58
2002	23.63	6.53	25.82	10.51	8.88	19.72	22.67	22.60	15.75	5.23
2003	26.36	5.22	28.22	10.37	9.75	22.18	25.54	25.93	15.60	8.03
2004	33.38	8.49	36.01	12.74	12.72	29.92	31.55	32.83	21.39	9.12
2005	34.49	9.74	36.36	12.79	12.83	30.78	31.94	32.76	21.94	9.19
2006	36.14	10.81	37.90	13.09	14.89	33.81	33.57	34.10	24.97	9.73
2007	36.41	10.31	37.41	12.86	14.96	34.15	34.94	34.80	26.67	8.72
2008	34.28	7.72	35.41	11.34	14.56	33.27	32.25	32.21	28.21	9.75
2009	33.40	6.55	34.65	10.05	15.52	34.11	30.62	31.03	20.42	11.44
2010	35.35	6.14	36.69	12.72	16.59	34.82	33.83	34.16	21.91	9.87